Switching (–20V, –2.0A)

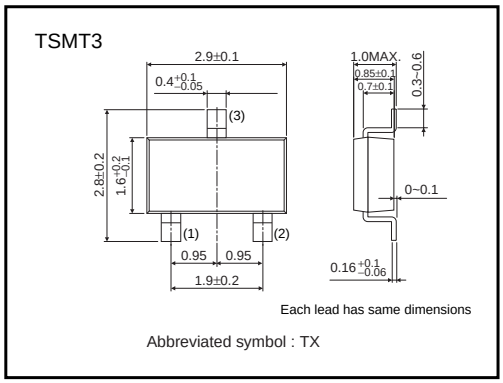
RTR020P02

●Features
1) Low On-resistance.
2) Built-in G-S Protection Diode.
3) Small and Surface Mount Package (TSMT3).

●Application
Power switching, DC / DC converter.

●Structure
Silicon P-channel
MOS FET

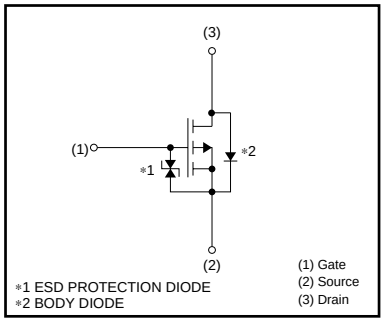
●External dimensions (Unit : mm)



●Packaging specifications

Type	Package	Taping
	Code	TL
	Basic ordering unit (pieces)	3000
RTR020P02		◯

●Equivalent circuit



●Absolute maximum ratings (Ta=25°C)

Parameter		Symbol	Limits	Unit
Drain-source voltage		V_{DSS}	–20	V
Gate-source voltage		V_{GSS}	±12	V
Drain current	Continuous	I_D	±2.0	A
	Pulsed	I_{DP} ∗1	±8.0	A
Source current (Body diode)	Continuous	I_S	–0.8	A
	Pulsed	I_{SP} ∗1	–3.2	A
Total power dissipation		P_D ∗2	1.0	W
Channel temperature		Tch	150	°C
Range of Storage temperature		Tstg	–55 to +150	°C

∗1 Pw≤10µs, Duty cycle≤1%
∗2 Mounted on a ceramic board

●Thermal resistance (Ta=25°C)

Parameter	Symbol	Limits	Unit
Channel to ambient	Rth (ch-A)	125	°C / W

●**Electrical characteristics** (Ta=25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Gate-source leakage	I_{GSS}	–	–	±10	μA	V_{GS}=±12V, V_{DS}=0V
Drain-source breakdown voltage	$V_{(BR)\ DSS}$	–20	–	–	V	I_D= –1mA, V_{GS}=0V
Zero gate voltage drain current	I_{DSS}	–	–	–1	μA	V_{DS}= –20V, V_{GS}=0V
Gate threshold voltage	$V_{GS\ (th)}$	–0.7	–	–2.0	V	V_{DS}= –10V, I_D= –1mA
Static drain-source on-state resistance	$R_{DS\ (on)}$ *	–	100	135	mΩ	I_D= –2.0A, V_{GS}= –4.5V
		–	110	150	mΩ	I_D= –2.0A, V_{GS}= –4.0V
		–	180	250	mΩ	I_D= –1.0A, V_{GS}= –2.5V
Forward transfer admittance	$\|Y_{fs}\|$ *	1.2	–	–	S	V_{DS}= –10V, I_D= –1.0A
Input capacitance	C_{iss}	–	430	–	pF	V_{DS}= –10V
Output capacitance	C_{oss}	–	80	–	pF	V_{GS}=0V
Reverse transfer capacitance	C_{rss}	–	55	–	pF	f=1MHz
Turn-on delay time	$t_{d\ (on)}$ *	–	11	–	ns	I_D= –1.0A
Rise time	t_r *	–	13	–	ns	V_{DD} ≒ –15V
Turn-off delay time	$t_{d\ (off)}$ *	–	38	–	ns	V_{GS}= –4.5V
Fall time	t_f *	–	12	–	ns	R_L=15Ω
						R_{GS}=10Ω
Total gate charge	Q_g	–	4.9	–	nC	V_{DD} ≒ –15V
Gate-source charge	Q_{gs}	–	1.2	–	nC	V_{GS}= –4.5V
Gate-drain charge	Q_{gd}	–	1.3	–	nC	I_D= –2.0A

*Pulsed

Body diode characteristics (source-drain characteristics)

Forward voltage	V_{SD}	–	–	–1.2	V	I_S= –0.8A, V_{GS}=0V

●Electrical characteristic curves

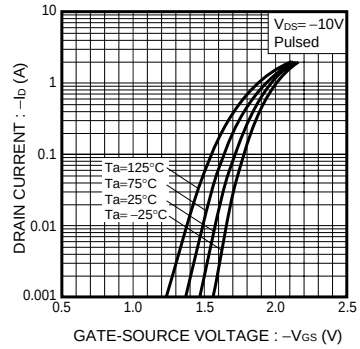


Fig.1 Typical Transfer Characteristics

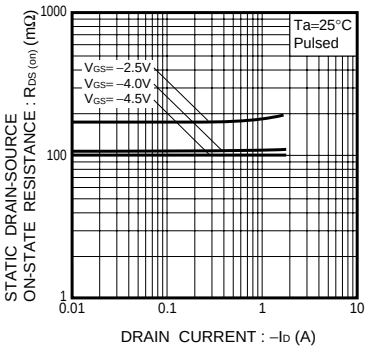


Fig.2 Static Drain-Source On-State Resistance vs. Drain Current

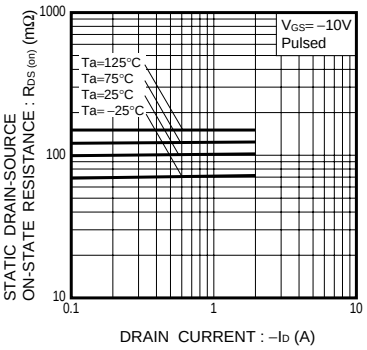


Fig.3 Static Drain-Source On-State Resistance vs. Drain Current

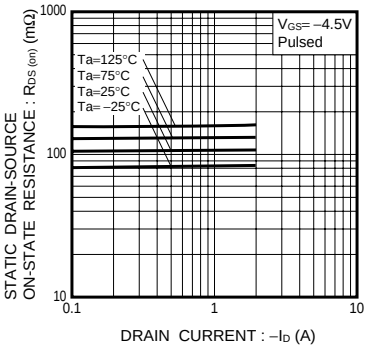


Fig.4 Static Drain-Source On-State Resistance vs. Drain Current

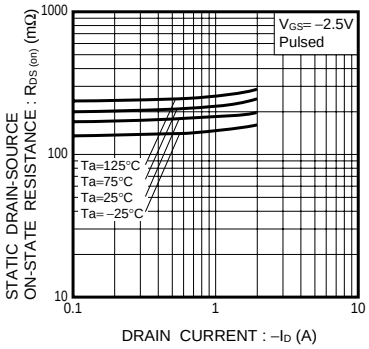


Fig.5 Static Drain-Source On-State Resistance vs. Drain Current

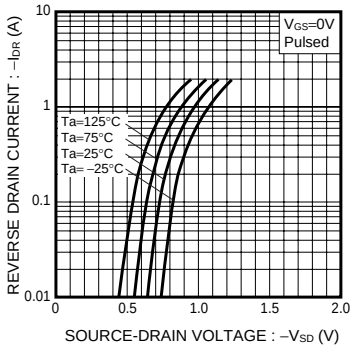


Fig.6 Reverse Drain Current vs.Source-Drain Voltage

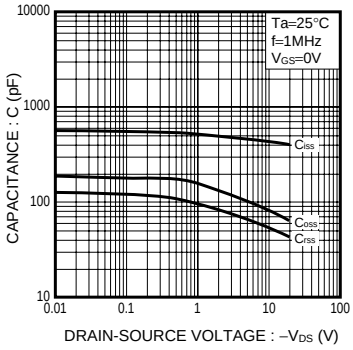


Fig.7 Typical Capacitance vs. Drain-Source Voltage

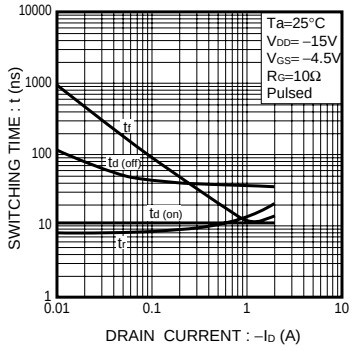


Fig.8 Switching Characteristics

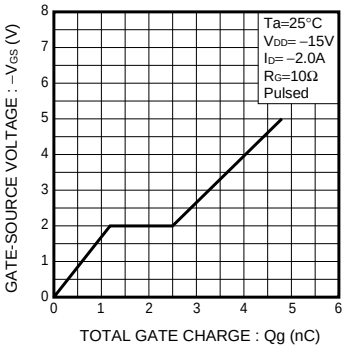


Fig.9 Dynamic Input Characteristics

●**Measurement circuits**

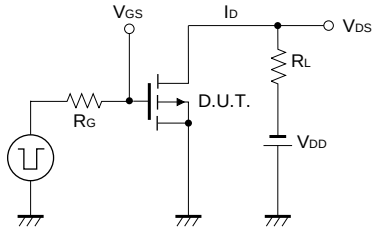


Fig.10 Switching Time Test Circuit

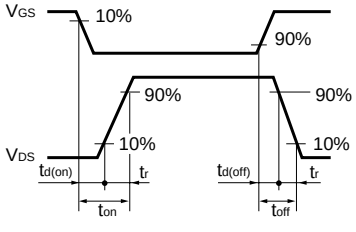


Fig.11 Switching Time Waveforms

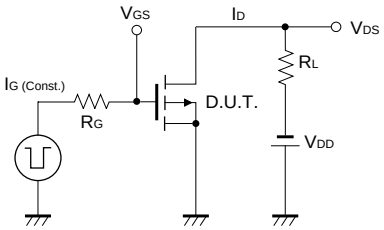


Fig.12 Gate Charge Test Circuit

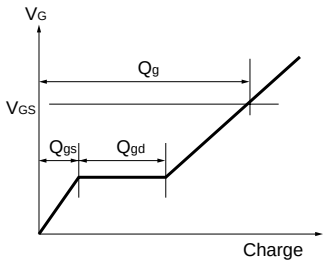


Fig.13 Gate Charge Waveform

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